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PRESENT CONSTRAINTS AND FUTURE OBSERVATIONS OF POSTGLACIAL REBOUND IN ANTARCTICA

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The relationship between Antarctic ice mass change and isostatic movement of the crust has interested glaciologists now for several decades. Nearly a decade ago Hager (1991) proposed that GPS data might be sensitive to present-day mass changes within ice sheets since these force a natural elastic response of the solid Earth. More recently, research has focused on the use of multiple geodetic strategies as these may reduce the nonuniqueness that corrupt solutions for mass balance that are based solely on crustal strain data. Of concern is the lack of constraint on the largest component of the crustal isostasy, post-glacial rebound, for this requires that tight bounds be placed upon both past ice sheet evolution and solid Earth rheological parameters. We discuss the constraints that glaciologists now impose on evolutionary models of mass exchange with the ocean since about 60 kyr BP and the breadth of possible crustal motions and temporal gravity driven by glacial isostasy. Of particular importance are the details of evolution over the past 5000 years, even in the absence of net exchanges with the ocean that exceed 2 meters in equivalent eustatic sea level change. We address the predicted vertical and horizontal signals and the conditions under which these would exceed tectonic rates after the removal of rigid plate motions.

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